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April 1979

THE ALMOND INDUSTRY OF SPAIN

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SUMMARY AND OUTLOOK

Spain has always been among the world's leading almond producers, along with the United States, Italy, Iran, Portugal, and Morocco. During the 1950's, it ranked second only to Italy in the production of almonds. Despite expanding output, Spain slipped to third place during the 1960's as the United States doubled its production and moved into the No. 1 position. In the early 1970's, with significantly larger almonds crops and declining Italian production, Spain regained its position as the second largest producer.

Spanish almond production has trended upward since the mid-1950's and has maintained a nearly constant one-fourth share of total world output. During the most recent 5-year period, 1974-78—when world almond production averaged 194,200 metric tons, shelled basis—51,100 tons were supplied by Spain.

Spain has traditionally been a large exporter, ranking second behind Italy during the 1950's and most of the 1960's and second to the United States during most of the 1970's. Spain briefly emerged as the world's leading exporter during the 1972/73 marketing season when a short crop reduced U.S. shipments.

Spain's export sales have been somewhat erratic over the years, increasing sharply from the mid-1950's to mid-1960's, remaining stagnant through the early 1970's, and increasing slightly since. Year-to-year crop fluctuations, and increasing domestic consumption, have restricted expansion of exports. Furthermore, Spain's share of the world almond trade has slipped over the years, from about a third of the total in the early 1960's to around a fourth during the 1970's, as U.S. shipments rose.

Spain will continue to compete with the United States and Italy for almond markets in the future. However, to expand its share of the trade, Spain will have to increase its almond supplies significantly. This will require the removal of a number of constraints and the application of modern cultural practices. Although these moves would provide additional production, adoption of such measures has not yet occurred.

With the possibility of membership in the European Community some time in the future, Spain

would likely gain a trade advantage over the United States, since eventually it would be exempt from the common external tariff of 7 percent ad valorem on almonds shipped to EC countries. However, there are significant obstacles that must be overcome before Spain can gain EC membership.

Almond production is expected to continue its upward trend in the future as various constraints are reduced or eliminated. However, early spring frosts may continue to plague the crop, causing year-to-year fluctuation in output.

Although almond plantings have slowed in recent years, there were about 55,000 hectares in 1978 that had not yet come into bearing. Planting in 1977 and 1978 is estimated at 4,000 and 6,000 hectares respectively. Virtually all recent plantings are of the improved varieties preferred by the export trade. This coupled with around 465,000 hectares of bearing trees could yield a crop of around 90,000 shelled tons by 1980. As more land is brought under irrigation and improved cultural techniques are applied, a 100,000-ton crop is entirely possible. Recent high prices and strong world demand could provide the incentive to implement production improvement measures.

Spanish almond shipments are expected to follow the general up-and-down pattern that has traditionally characterized production. Exports should expand with production but at a slower rate, as the burgeoning domestic market—stimulated by increased living standards and promotional activity—absorbs a greater share. Unless high prices discourage domestic consumption, export availabilities for 1978/79 may be only around 28,000 tons, up a third from the previous year's level but still significantly below the 34,900 tons shipped in 1972/73.

Spain will continue to compete with the United States and Italy for market outlets for its almonds. Despite Spain's transportation advantage, the United States has remained competitive in European markets because of its lower cost of production. The United States has captured the lion's share of the Asian market, one of the fastest growing outlets, because of the shipping advantage, and will continue to expand there. Spain's exports to Latin American countries, which declined sharply over the years, may have stabilized and should continue at their present level.

Any expansion in the Latin American market will likely be supplied by the United States, whose sales there have increased in recent years. Spain and the United States will also be competing for greater access to the relatively new Mideastern markets where Spain currently holds the edge.

Spain must also compete for almond markets with Italy, whose principal outlet is the European Community. Italy, as a member of the European Community, ships almonds duty free to member countries and enjoys an export subsidy to help promote almond sales to non-EC countries. Furthermore, Italy, whose production and exports were declining during the early 1970's, has rebounded in recent years to become a major producer/exporter again.

The prospect of Spain's attaining EC membership in the future would have a significant impact on world almond trade. As a member of the European Community, Spain would be exempt from the common external tariff on imported almonds and could receive some form of export subsidy like the one currently in effect for EC countries. Should this occur, the United States stands to lose a share of its principal market, the European Community, where over half of its exports go. For this to happen, however, Spain would have to expand its almond production sharply, either by increased tree plantings or by implementing modern cultural practices. There are still numerous obstacles for Spain's almond industry to overcome before such a development could occur.

PRODUCING AREA

Almonds are produced throughout most of Spain; however, commercial production is primarily concentrated in those provinces bordering the Mediterranean Sea because of the favorable climatic conditions that prevail there. These provinces form a narrow belt extending from the Pyrenees Mountains in the northeast to the Portuguese border in the southwest. The Balearic Islands, which lie off Spain's eastern coast, are also part of the almond-producing area.

The producing area is divided into three principal regions: The Northeast, Levant in the east, and eastern Andalusia in the southeast. Growing area in these regions—which comprise over 80 percent of Spain's almond area—is not specifically delineated but is based primarily on similarities in climate, varieties, trading patterns and production problems.

The Northeast region includes the four northeasternmost Provinces of Barcelona, Gerona, Lerida, and Tarragona, together with the six Balearic Islands. In 1976, this region contained 130,943 hectares of almonds, or 27 percent of Spain's total plantings.

Farther south along the Mediterranean coast is the Levant region. Consisting of the Provinces of Castellon, Valencia, Alicante, and Murcia, the region accounted for one-third of Spain's almond area in 1976 with 167,708 hectares. In the southeast, the Provinces of Almeria, Granada, Jaen, and Malaga make up eastern Andalusia, where almond plantings comprise 113,056 hectares, or about 22 percent of total land in almonds.

Almond area in Spain has increased dramatically since 1955. Total land planted to almonds rose from 161,400 to 520,000 hectares in 1978. Except for moderate area expansion in 1960 and 1964, most of the growth has occurred during the 1970's. The greatest annual increase took place between 1971 and 1972 when 70,000 hectares were added. Area expansion has continued since then, with an additional 123,200 hectares planted in almonds by 1978. However, the annual rate of increase has fallen sharply from a high of 21 percent in 1972 to only 1 percent in 1978.

PRODUCTION

Until the late 1950's, commercial almond production in Spain remained relatively unchanged, averaging around 23,500 metric tons, shelled basis. Average output during the first half of the 1960's expanded moderately to around 28,000 tons as bearing area increased. During the latter 1960's average output stagnated at around 30,100 tons, as almond plantings slowed and severe freezes cut crops drastically in 1967 and 1969. Production then moved up strongly during the first half of the 1970's—rising from 32,000 tons in 1970 to 55,000 tons in 1974—because of substantial increases in bearing trees and favorable climatic conditions.

Since 1974 the Spanish almond crop had severe frost damage in 1975 and 1977 and a record high, 65,000-ton output in 1976. The bumper crop of 1976 was attributed to new almond areas coming into production, excellent pollination conditions during the spring, and frost-free weather throughout the country's almond-producing regions.

With new orchards coming into bearing in 1978, Spain's potential output was raised to 70,000 tons. However, frosts in February and April damaged the crop in the Provinces of Murcia and Lerida, while high winds knocked down a considerable quantity of nuts in Majorca. Poor pollination reportedly reduced yields in a number of the Andalusian Provinces. As a result, Spain's 1978 almond output is currently forecast at 60,000 tons, 88 percent better than the frost-reduced crop in 1977, but still below potential.

Table 1.—Commercial almond production by country, 5-year average 1950-74, annual 1965-78
(1,000 metric tons, shelled basis¹)

Year	Iran	Italy	Morocco	Portugal	Spain	Other ²	Foreign total	United States	World total
Five-year av.									
1950-54	6.9	35.6	2.7	4.8	23.8	2.0	75.8	18.1	93.9
1955-59	7.3	27.2	2.9	2.9	21.8	3.8	65.9	21.6	87.5
1960-64	6.0	33.5	2.9	3.1	28.0	5.8	79.3	29.8	109.1
1965-69	5.2	35.6	4.2	3.5	30.1	6.2	84.8	42.1	126.9
1970-74	8.5	17.4	3.4	6.3	41.4	7.1	84.1	72.8	156.9
1965	7.0	37.0	6.0	4.0	27.0	6.1	87.1	35.7	122.8
1966	1.5	38.0	4.0	1.5	37.0	6.1	88.1	43.0	131.1
1967	5.0	39.0	5.0	5.5	27.0	6.1	87.6	37.3	124.9
1968	7.2	42.0	3.2	4.5	37.5	8.2	102.6	36.4	139.0
1969	5.5	22.0	3.0	2.2	22.0	4.5	59.2	58.3	117.5
1970	10.0	34.0	3.0	5.7	32.0	8.2	92.9	64.4	157.3
1971	7.1	16.0	2.5	6.5	33.0	8.2	73.3	69.9	143.2
1972	9.0	15.0	4.8	6.3	50.0	7.0	92.1	64.4	156.5
1973	8.1	8.0	5.0	8.0	37.0	6.1	72.2	66.4	138.6
1974	8.5	14.0	1.5	5.0	55.0	6.1	90.1	98.9	189.0
1975	8.2	15.0	1.5	3.5	43.5	5.0	76.7	77.2	153.9
1976	7.0	16.5	2.0	5.2	65.0	8.0	103.7	117.1	220.8
1977	8.7	23.0	1.7	1.6	32.0	10.0	77.0	129.2	206.2
1978 ³	5.1	26.0	3.5	3.5	60.0	10.0	108.1	93.0	201.1

¹ One ton of inshell almonds equals 0.3 ton of kernels.

² Includes Algeria, Canary Is., Cyprus, France, Tunisia, and Yugoslavia.

³ Estimate.

Source: Iran, Italy, Morocco, Portugal, and Spain, U.S. Agricultural Attaché Reports; Others, Gill and Duffus Landauer Ltd. (London, December 1977 issue); United States, The Almond Board of California.

**ALMONDS: COMMERCIAL PRODUCTION
IN SPECIFIED COUNTRIES
AND WORLD, 1965-78**

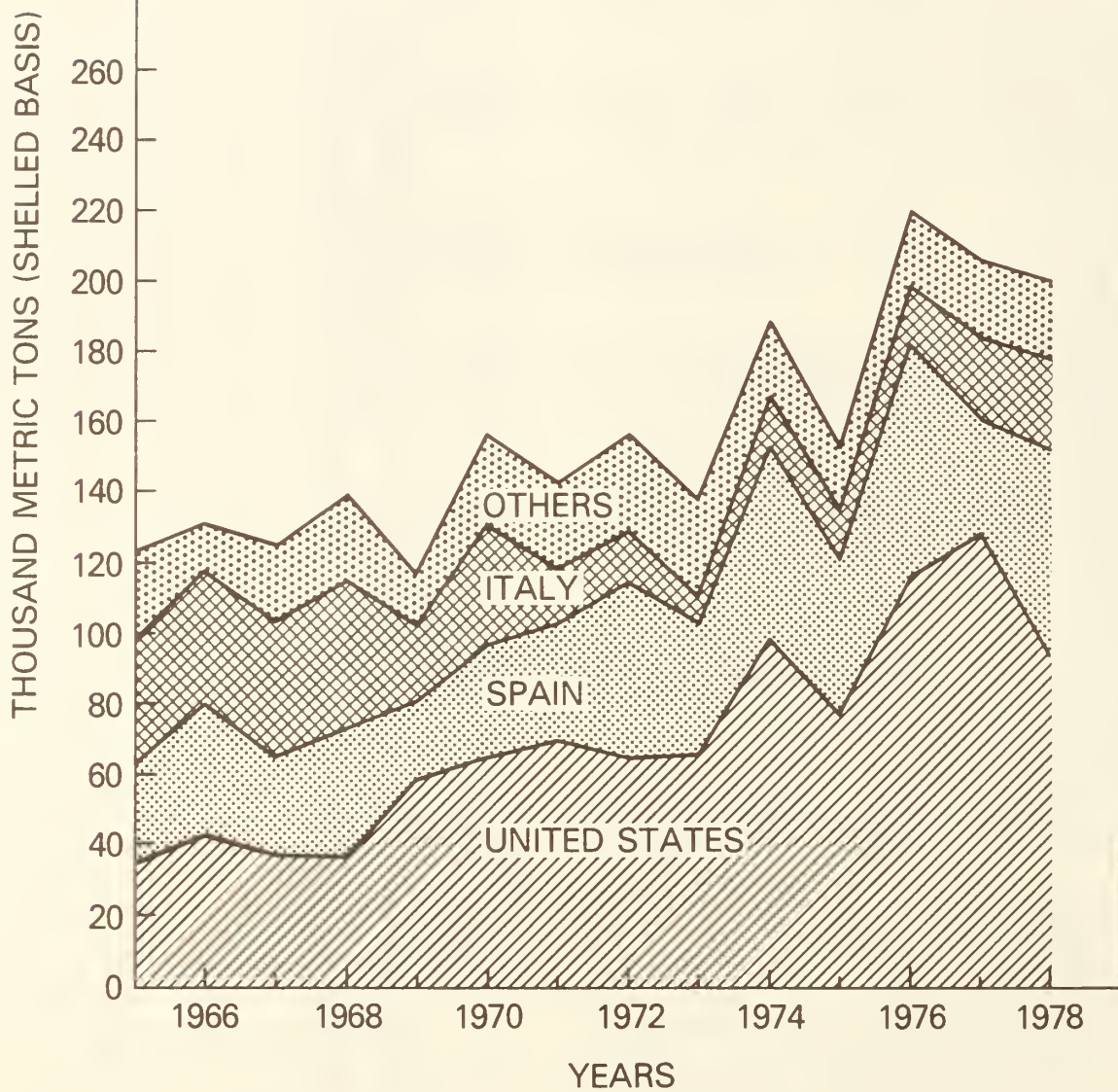


Table 2.—Almond exports by country, marketing years 1950/51-1977/78
(1,000 metric tons, shelled basis¹)

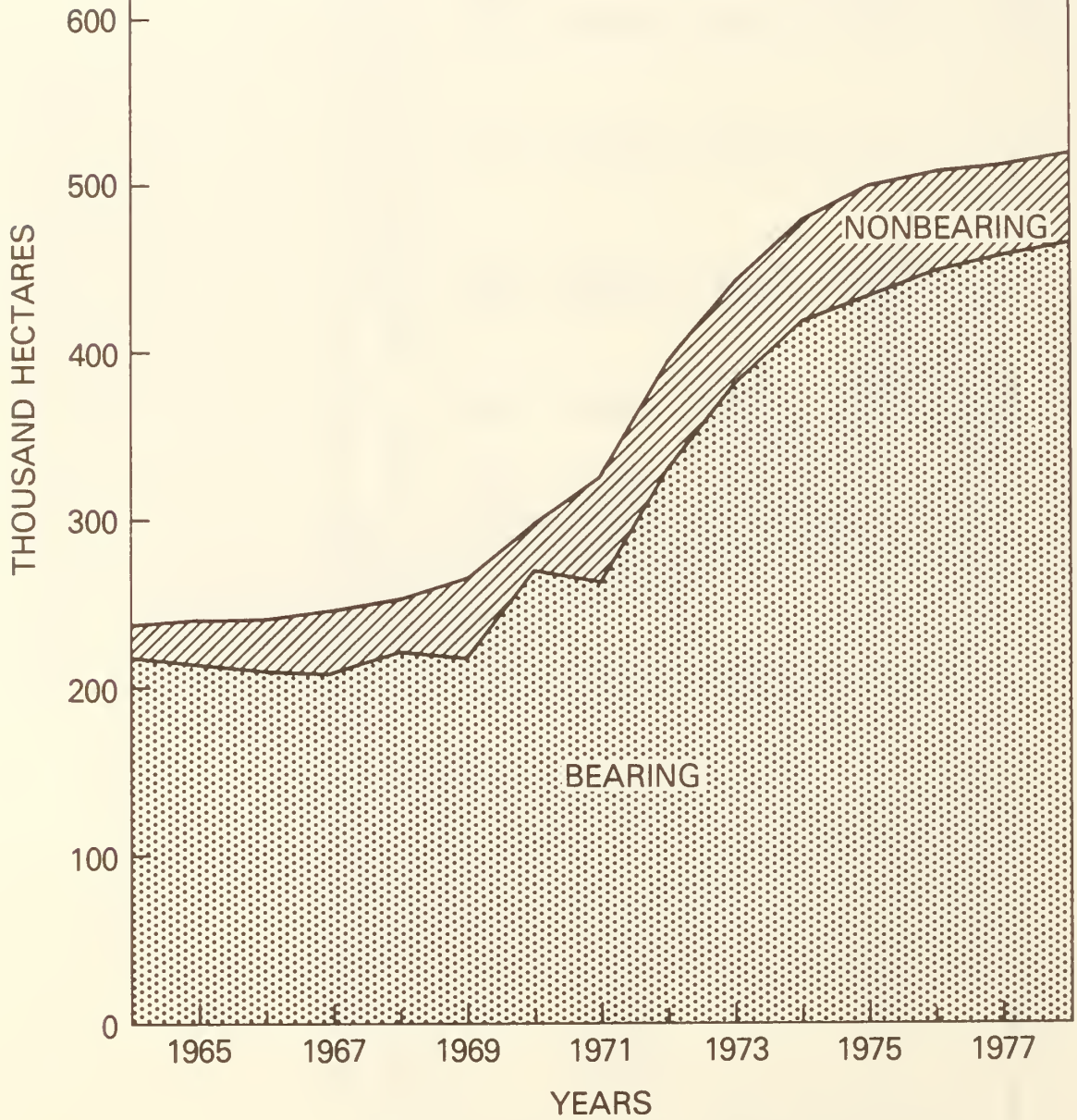
Marketing year ²	Iran	Italy	Morocco	Portugal	Spain	Others ³	Foreign total	United States	World total
Five-year av.									
1950-54	5.1	31.0	1.4	5.8	15.4	2.1	60.8	2.0	62.8
1955-59	4.3	19.1	2.0	3.0	15.1	1.7	45.2	4.4	49.6
1960-64	3.8	27.6	2.0	3.2	23.3	2.0	61.9	6.1	68.0
1965-69	2.9	27.4	3.0	3.0	22.5	2.1	60.9	13.9	74.8
1970-74	4.3	9.2	2.2	4.5	22.7	2.2	45.1	37.1	82.2
1965/66	2.3	27.4	4.5	3.0	22.0	2.2	61.4	10.4	71.8
1966/67	.5	31.7	2.7	1.3	29.4	2.3	67.9	10.1	78.0
1967/68	2.5	28.5	3.6	5.1	21.6	1.4	62.7	11.9	74.6
1968/69	5.0	31.9	2.3	4.1	26.2	3.1	72.6	9.5	82.1
1969/70	4.3	17.6	2.0	1.7	13.2	1.4	40.2	27.6	67.8
1970/71	5.8	17.9	2.0	2.9	17.6	1.9	48.1	31.0	79.1
1971/72	4.4	13.1	1.5	5.3	23.4	2.0	49.7	40.8	90.5
1972/73	6.3	9.6	3.6	5.6	34.9	1.1	61.1	31.4	92.5
1973/74	3.5	3.3	3.8	6.6	17.9	3.5	38.6	35.1	73.7
1974/75	1.7	2.1	.1	2.3	19.6	2.4	28.2	47.1	75.3
1975/76	2.0	5.1	---	1.8	21.6	1.9	32.4	56.0	88.4
1976/77	1.8	9.6	---	3.2	31.7	1.7	48.0	68.3	116.3
1977/78	2.0	12.9	.4	2.2	20.4	2.1	40.0	75.3	115.3

---Denotes not available, unknown, or not applicable.

¹ One ton inshell almonds equals 0.3 ton of kernels. ² Marketing year beginning July 1 for United States; July 1 for Morocco except year 1977, which begins August 1; September 1 for Italy, Portugal, and Spain; September 23 for Iran and calendar year for others. ³ Includes Algeria, Canary Is., Cyprus, France, Tunisia, and Yugoslavia.

Source: Iran, Italy, Morocco, Portugal, and Spain, Official Trade Data and U.S. Attaché Reports; United States, Almond Board of California (July 1978 issue); Others, Gill and Duffus Landauer Ltd. (London, December 1977 issue).

**SPANISH ALMOND AREA: BEARING
AND NONBEARING, 1964-78**



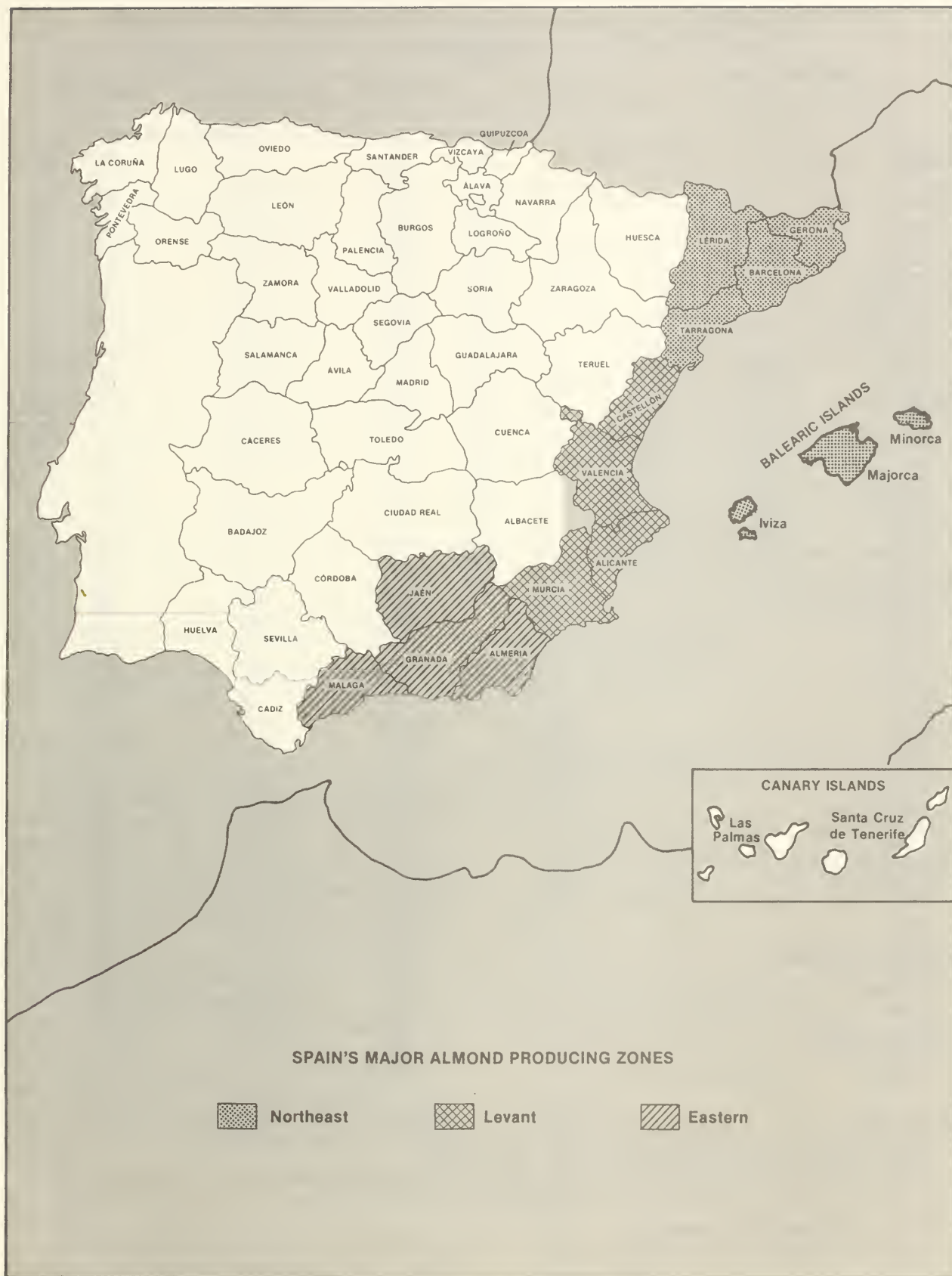


Table 3.—Spain: Almond area and yield, irrigated and nonirrigated by region and provinces, 1976

Region and provinces	Area ¹		Yield ²	
	Irrigated	Nonirrigated	Irrigated	Nonirrigated
	----- hectares -----		----- kilograms per hectare -----	
NORTH	0	218	0	800
Alava	0	218	0	800
EBRO	511	51,445	1,230	741
Huesca	0	11,727	0	700
Logrono	70	8,144	1,550	1,040
Navarre	180	2,690	2,000	820
Teruel	0	11,865	0	1,450
Saragossa	261	17,019	600	300
NORTHEAST	912	130,031	1,412	429
Balearic Islands	0	79,996	0	220
Barcelona	5	2,335	2,000	1,300
Gerona	3	59	1,500	500
Lerida	585	25,357	1,600	1,000
Tarragona	319	22,284	1,033	500
DOURO	44	5,020	881	662
Avila	32	30	500	140
Burgos	1	81	1,000	350
Leon	1	21	1,200	450
Palencia	0	17	0	1,155
Salamanca	0	2,604	0	600
Ségovia	0	26	0	350
Soria	10	140	2,400	1,800
Valladolid	0	102	0	1,500
Zamora	0	1,999	0	650
CENTRAL PLATEAU	110	24,040	596	588
Albacete	34	12,900	950	500
Ciudad Real	61	2,913	330	178
Cuenca	0	6,121	0	1,060
Guadalajara	3	490	450	300
Madrid	12	314	1,500	800
Toledo	0	1,302	0	350
LEVANT	22,072	145,636	1,427	649
Alicante	13,090	39,667	1,620	839
Castellon	1,056	36,700	1,400	600
Murcia	7,838	47,795	1,000	400
Valencia	88	21,474	1,200	900
ESTREMADURA	94	2,617	1,188	586
Badajoz	90	2,475	1,200	600
Caceres	4	142	750	300
EASTERN ANDALUSIA	3,756	109,300	1,855	527
Almeria	2,483	37,162	2,000	400
Granada	1,203	45,453	1,600	570
Jaen	70	5,754	1,400	1,300
Malaga	0	20,931	0	500
WESTERN ANDALUSIA	108	14,050	2,925	1,426
Cadiz	10	792	1,800	1,400
Cordova	28	2,643	2,814	2,460
Huelva	1	9,734	2,000	1,000
Seville	69	881	3,000	1,500
CANARY ISLANDS	0	677	0	181
Las Palmas	0	625	0	170
Teneriffe	0	52	0	400
TOTAL SPAIN	27,607	483,034	1,484	576

NOTE: 1976 is the most recent year for which detailed data are available.

¹ Includes both bearing and nonbearing area. ² Yield is on inshell basis, with shell out ranging from 18 percent for hard shell varieties to 40 percent for soft shell. Most of Spain's production is of hard shell variety.

Source: Spanish Ministry of Agriculture.

Table 4.—Spanish almond area: Bearing and nonbearing, annual 1955-78
(1,000 hectares)

Year	Bearing	Nonbearing ¹	Total	Percent change
1955	161.4	---	---	---
1956	171.4	---	---	---
1957	171.6	---	---	---
1958	172.4	---	---	---
1959	177.6	---	---	---
1960	201.5	---	---	---
1961	203.6	---	---	---
1962	206.6	---	---	---
1963	208.9	---	---	---
1964	217.0	21.6	238.6	---
1965	215.3	24.9	240.2	1
1966	210.7	31.9	242.6	1
1967	209.7	37.6	247.3	2
1968	222.8	29.8	252.6	2
1969	217.2	49.0	266.2	5
1970	269.2	29.5	298.7	9
1971	262.5	64.3	326.8	9
1972	331.9	64.9	396.8	21
1973	382.0	59.8	441.8	11
1974	419.9	60.1	480.0	9
1975	434.8	65.2	500.0	4
1976	450.0	60.6	510.6	2
1977	458.0	56.0	514.0	1
1978 ²	465.0	55.0	520.0	1

--Denotes not available, unknown, or not applicable.

¹ Data on nonbearing area not available before 1964.

² U.S. Agricultural Attaché estimate.

Source: Spanish Ministry of Agriculture, Annual Yearbooks, except as noted.

VARIETIES

Numerous varieties of almonds are produced in Spain; more than 100 varieties can be found on the island of Majorca alone. Almonds are basically classified according to shell characteristics. The three major categories include: Hard shell (Dura), soft shell (Mollar), and semi-soft shell (semi-Mollar). The principal hard-shell almonds are the Valencia and Majorca classes and the Marcona, Ramillete, Planeta, Langueta, and Desmayo varieties. These comprise the bulk of Spain's commercial almond crop.

Mollar Fita and Blanqueta are the most popular soft-shell varieties, accounting for about 5 percent of production. The semi-soft shell class includes Pico de Cuervo, Piedad, and Real Caragola varieties, which form a very small percentage of total output. The following is a brief description of the principal varieties:

Hard Shell

Valencia

Best known commercial class into which unspecified varieties are placed; grows in every region except Majorca; constitutes the bulk of

Spanish production; shelling rate of 18 to 24 percent. Use: Confectionery, blanched, salting.

Majorca

A popular class, also known as Farmer Majorca, composed of many varieties grown on island of Majorca; all varieties are sweet; shelling rate of 20 to 26 percent. Use: Confectionery.

Marcona

Accounts for approximately 30 percent of total almond production; yields 2 to 3.5 kilograms of kernels per tree; has a shelling rate of 23 to 25 percent; and has a late bloom, which constitutes a defense against frosts. Use: Confectionery, blanched, salting.

Ramillete

Drought-resistant variety; yields 2 to 3.5 kilograms per tree; shelling rate of 23 to 25 percent. Use: Confectionery.

Planeta

Good kernel flavor; shelling rate of 21 to 25 percent; yields 2 to 3.5 kilograms per tree; offers little or no resistance to cryptogamic diseases (spore borne). Use: Confectionery.

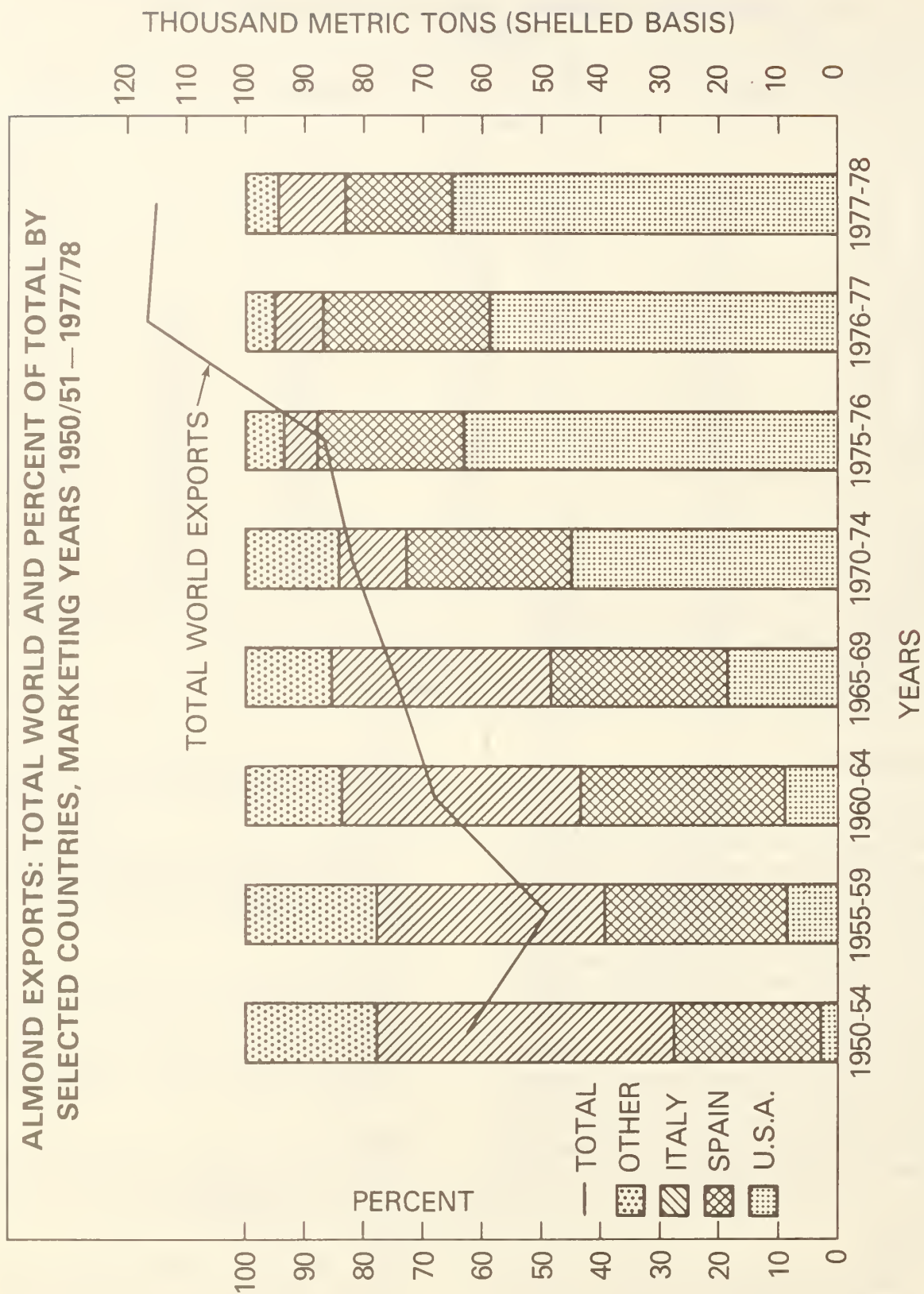


Table 5.—Spanish almonds: Supply and distribution, five-year average 1960-74, annual 1965/66-1978/79
(1,000 metric tons, shelled basis¹)

Marketing year ²	Beginning stocks	Production	Domestic supply	Deliveries			Ending stocks
				Domestic	Export	Total	
Five-year av.							
1960-64	3.3	28.0	31.3	5.6	23.3	28.9	2.4
1965-69	2.0	30.1	32.1	7.3	22.5	29.8	2.3
1970-74	4.3	41.4	45.7	15.1	22.7	37.8	7.9
1965/66	1.8	27.0	28.8	5.9	22.0	27.9	.9
1966/67	.9	37.0	37.9	6.7	29.4	36.1	1.8
1967/68	1.8	27.0	28.8	5.4	21.6	27.0	1.8
1968/69	1.8	37.5	39.3	9.5	26.2	35.7	3.6
1969/70	3.6	22.0	25.6	8.9	13.2	22.1	3.5
1970/71	3.5	32.0	35.5	12.9	17.6	30.5	5.0
1971/72	5.0	33.0	38.0	10.6	23.4	34.0	4.0
1972/73	4.0	50.0	54.0	14.1	34.9	49.0	5.0
1973/74	5.0	37.0	42.0	19.1	17.9	37.0	5.0
1974/75	5.0	55.0	60.0	18.9	19.6	38.5	21.5
1975/76	21.5	43.5	65.0	28.4	21.6	50.0	15.0
1976/77	15.0	65.0	80.0	26.3	31.7	58.0	22.0
1977/78	22.0	32.0	54.0	25.5	20.4	45.9	8.1
1978/79 ³	8.1	60.0	68.1	25.0	28.0	53.0	15.1

¹ One ton of inshell almonds equals 0.3 ton of kernels.

² Marketing beginning September 1.

³ Estimate.

Source: Official Trade of Spain, U.S. Agricultural Attaché Reports, and *Almond Industry of Italy and Spain*, FAS-M 228, May 1971. Table balanced by domestic deliveries column.

Largueta

Shelling rate of 21 to 23 percent; long, plump kernel. Use: Confectionery, blanched.

Desmayo

Late blooming; particularly resistant to late frosts and cold weather; accounts for about 20 percent of total production; has large, flat elongated kernel. Use: Confectionery.

Soft Shell

Mollar Fita

Yields 1 kilogram of kernels per tree; shelling rate of 35 to 40 percent. Use: Inshell sales.

Blanqueta

Yields 1 kilogram of kernels per tree; shelling rate of 35 to 40 percent.

Semi-Soft Shell

Pico de Cuervo

Yields 2 to 3 kilograms of kernels per tree; shelling rate of 24 to 30 percent.

Piedad

Yields 2 to 3 kilograms per tree; shelling rate of 30 to 33 percent.

Real Caragola

Yields 2 kilograms per tree; shelling rate of 32 to 35 percent.

The shelling rate for Spanish almonds is quite low compared with an average yield of 55 percent for California almonds, because most of Spain's almonds are hard-shell varieties, while the bulk of California almonds are the soft-shell types. However, the shell-out for Spanish almonds is comparable to almonds produced in other Mediterranean countries like Portugal and Italy. Likewise, production per tree is very small. The primary causes include insufficient moisture, inadequate cultural practices, and the advanced age of most trees.

CULTURAL PRACTICES

Spain's almond-producing sector comprises thousands of small farms scattered throughout most of the country, with the highest concentration in those provinces adjacent to the Mediterranean Sea. Many of the farms are not devoted exclusively to almond production, but are diversified in other crops as well.

Cultivation and Intercropping. In the past, farmers believed that almonds would yield a profit on marginal land where little else could be grown save olives and carobs. As a result, many of Spain's almond orchards are planted on nutrient-deficient,

clay-like soils. Most of Spain's commercial almond areas are also fruit- and vegetable-producing zones, and the choicest land is reserved for these higher yielding and more profitable crops.

In specialized orchards where only almonds are planted and also in areas where there is insufficient moisture for intercropping, the soil is clean-cultivated and smoothed. Where there are intercrops, generally in older orchards, the soil is plowed and leveled between plantings. Intercropping usually entails rotation of small grains, legumes, and some vegetable crops. There is also some pasturing of livestock in almond orchards, mostly in the northern provinces. Only a small percentage of Spain's almond area is intercropped because land suitable for intensive cultivation has been taken out of almond production and put into more profitable annual crops.

Irrigation. Most of Spain's almond trees have been planted on marginal land usually far from usable water sources. Consequently, when there is inadequate rainfall, yields are low and crop quality suffers. Where water is available, higher value crops, such as citrus, deciduous fruits, or vegetables are generally grown.

In 1978, 32,000 hectares of almonds were under irrigation. This represents a nearly three-fold increase in irrigated land over the past 10 years. However, the proportion of total land in almonds receiving irrigation rose only slightly, from 4 percent in 1967 to 6 percent in 1978.

Most of Spain's irrigated almond orchards are located in the Levant region, principally in the Province of Alicante. Out of the 167,708 hectares of almonds in the Levant region in 1976, 22,072 hectares were irrigated, representing nearly 80 percent of Spain's irrigated almond areas. The provinces in the eastern Andalusian producing region contain 3,756 hectares of irrigated land, or 14 percent of the total.

Today the agricultural community and the Government together are making an intensive search for underground water sources. In addition, every attempt is being made to conserve moisture from rainfall. In many areas, basins are dug around the trees to capture the rain, while trenches are used to channel the runoff into the orchards.

Seedlings and Rootstocks. Generally, almond trees are propagated on the seedling rootstocks of bitter almond varieties, although cherry, plum, apricot, and peach seedlings have also been used. Seedlings can be obtained from either State-owned or commercial nurseries, while many of the larger producers grow their own seedlings.

In the past, direct sowing of almond seeds was used by some farmers to economize on the purchase of seedlings from nurseries. This approach had serious disadvantages as multiplication by seed resulted in a loss of homogeneity in the orchard.

Pruning. The extent and the frequency of pruning vary from area to area at the discretion of the individual producer. In general, there are two basic pruning operations performed by most growers in the intensive producing areas: 1) Fructification—removal of dead or diseased wood and nonessential branches to conserve tree nutrients; 2) rejuvenescence—removal of old, nonproductive branches to permit development of secondary shoots.

These pruning operations are usually carried out in late September following the harvest, about every third year. Some light pruning is required periodically throughout the growing season to remove limbs damaged by winds.

Fertilization. Fertilization is perhaps the cultivation practice that has had the greatest influence on nut yields. The quantity of fertilizers devoted to cultivation of almond trees has increased considerably in recent years. Because of favorable prices for almonds, modern chemical fertilizers are replacing the traditional mixtures of animal manure and ash (obtained by burning almond hulls). This development has led to an increase in yields, but not to the extent that it should have because of insufficient quantities of fertilizers, imbalanced fertilizer mixtures, and improper application.

Many growers over use nitrogenated fertilizers primarily because the reaction of almond trees to these fertilizers is more spectacular. The use of large quantities of chicken manure in the past gave rise to trees that grew vigorously but had relatively low yields. Furthermore, the timing and application of fertilizers are irrational in many cases because little consideration is given to the physiology of the trees. There are three stages in the fertilization process:

- **Preplanting**—Land is prepared for the young trees. Muriate of potash, superphosphate, and manure are spread. Approximate dosages are:

Superphosphate.	.998 - 1,502 kilograms per hectare
Muriate of potash.	.403 - 600 kilograms per hectare
Manure	17 - 39 metric tons per hectare

- **Nonbearing**—Each autumn growers apply a mixture of ammonium sulfate (30 percent), superphosphate (60 percent), and muriate of potash (10 percent). The following spring, when the rains arrive, a mixture of ammonium sulfate and ammonium nitrate may be applied.
- **Producing**—Approximately 5 years after planting, the following mixture is used: Ammonium sulfate (40 percent), superphosphate (40 percent), and muriate of potash (20 percent). Application usually

occurs in the autumn and spring, with manure often used as a supplement.

Spraying. Although insects and diseases affect Spain's almond orchards, use of commercial insecticides and fungicides is not widespread, especially in areas of scattered plantings where it is not economically feasible. Some of the larger, specialized plantations have instituted pest management measures involving use of the insecticides Findane and Malathion.

Harvesting. Spain's almond crop is harvested over a 3-month period—August through October. The harvest commences in early August in the southernmost region, Andalusia, continues up the eastern coast into the Levant region and is completed in the northeast region some time in early October.

Mechanical harvesting of almonds is not widely practiced because of the nature of almond plantings: irregularity of the terrain, scattered tree spacing, relative abundance of labor, and the practice of intercropping in some areas.

Almonds are still principally harvested by hand in Spain, the nuts being knocked from the tree with a long pole and gathered in a ground cloth placed around the base of the tree. Some producers use a cloth-framed cart drawn under the tree to catch the nuts as they fall.

Farm Labor. Labor used in the almond production process is generally provided by the farm operator and his family. On some of the larger units, a few permanent field workers are employed yearround with some part-time labor hired during the harvest season. Permanent employees are usually furnished housing and some farm produce. Paid vacations and regular bonuses have also become common practices.

MARKETING

Spain's almond marketing system contains four basic entities: Growers, buyers, processors, and wholesalers. Almond supplies are usually procured at the farm level either by buyers, who include agents located throughout the producing areas, or speculators located in the major trade centers. Agents and speculators purchase the nuts from the growers both in the shelled and inshell form and deliver these to processors. Some of the agents operate their own semiprocessing plants where the nuts are shelled before delivery. Some direct purchasing between processors and growers occurs, but is generally of a limited nature.

Once almonds are processed and packaged, wholesalers distribute supplies to the domestic and export markets. In most cases today, the wholesaler has been integrated back through the processing stage, which has resulted in more efficient marketing.

PROCESSING

Almond processing plants are characterized by a wide range in the size, amount, and type of equipment as well as in the amount of labor employed. The development of the processing industry over the past 20 years has been marked by declining plant numbers, expanding size, and greater mechanization. Machinery and equipment are, for the most part, manufactured in Spain and usually designed and modified to meet each processor's needs and specifications. Some machinery is imported from Italy.

Since the market for inshell nuts has dwindled to a negligible level, most of Spain's almond production is shelled. The bulk of the shelling takes place at fairly large modern plants. Less than a third of the shelling occurs at small shelling plants in the growing areas. Most of these smaller units are mechanized only in the cracking process with hand labor used to separate the kernels from the shells. The kernels are then usually delivered to larger plants for further processing.

Almonds are delivered by truck to the processing plants either in 100-kilogram sacks or in bulk. Nuts not processed immediately are generally stored in large underground concrete bins by variety; small quantities of a particular variety may be kept in burlap bags.

When the nuts are ready for processing, they are transported by conveyor belt to the cracking area, which is usually located on the plant's upper level. The nuts are put through cracking machines and are separated from the shells by shakers and screens. The kernels are then sized and pass to the lower level of the plant where they are given a final grading and sorting according to Spanish standards. During this process, the kernels pass along a continuous belt where they are graded and sorted by crews of women. Periodic inspections are made by the management to insure maintenance of certain quality standards. Broken almonds and pieces are culled and further processed into other almonds products. Finally, whole almond kernels are either blanched or immediately packed for export or domestic use.

DOMESTIC CONSUMPTION

Spanish almond consumption averaged 23,640 tons (shelled basis) in the 5-year period 1973-77, or 51 percent of production. This represents a dramatic increase from an average annual consumption of 6,450 tons during the 1960's when only about 22 percent of production was consumed locally. The growth in domestic consumption was extremely rapid between 1969/70 and 1975/76, rising from less than 9,000 tons to a record of more than 28,000 tons.

Consumption has since declined somewhat as exports have taken a larger share of available supplies.

Rising incomes and changing consumer tastes have stimulated local demand for almonds and almond products. The almond industry advertises via newspapers, magazines, radio, and television, mostly in the high consumption areas, such as Madrid.

The candy manufacturing industry uses about half of domestic supplies for the production of nougat and sugar-coated almonds. Almonds are also used in the production of other confectionery products, pastry, salted nuts, almond syrup and milk, flavoring for soft drinks, and almond oil for perfumes and cosmetics. The trade feels that snack packs, commonly found in Spain today, will continue to develop as an important outlet in future years. Domestic usage is expected to continue to expand with incomes and the demand for new almond products. It appears that between 40 and 50 percent of Spain's almond production will continue to be consumed domestically.

FOREIGN TRADE

During the 1977/78 marketing season, Spain was the world's second largest exporter of almonds behind the United States. Up until 1969, Spain ranked second to Italy as a major almond exporting country with the United States in third place. Because of disastrous crops in Italy and Spain in 1969 and a bumper crop in California, the United States surged ahead of Italy into first place in 1969/70 and Spain dropped into third place. This relationship held until 1971/72 when Italy, again plagued by a short crop, fell behind Spain. Except for a brief recovery as the world's leading almond exporter in the 1972/73 season, Spain has remained second to the United States in almond sales.

Spain's almond exports followed the general pattern of domestic production up through the mid-1960's. During the 1950's, exports were stagnant at around 15,250 metric tons, shelled basis, accounting for about two-thirds of production. In the 5-year period 1960-64, exports averaged 23,300 tons, a 54-percent larger volume than in the last half of the 1950's. However, during this period, export sales expanded at a faster rate than production. As a result, exports' share of production jumped to 83 percent.

Despite a slight expansion in production during the last half of the 1960's, exports actually declined slightly to around 22,500 tons as growing domestic consumption reduced export availabilities. The moderate growth in almond output in the period 1970-74 was again absorbed by the burgeoning domestic market, leaving average export shipments stagnant at 22,700 tons and reducing their share of production to 55 percent.

Table 6.—Almond exports from Spain, shelled: Av. 1970/71-1974/75, 1973/74-1977/78
(Metric tons)

Country of destination	Average 1970/71- 1974/75	Marketing year beginning October 1				
		1973/74	1974/75	1975/76	1976/77	1977/78
United States	116	34	120	110	163	2
Europe						
EC:						
Belgium-Luxembourg	320	306	472	372	376	92
Denmark	212	124	105	212	376	11
France	5,487	4,147	4,897	5,495	7,434	5,101
Germany, West	5,651	4,688	5,070	6,118	7,964	4,570
Ireland	40	5	5	---	---	---
Italy	1,549	1,327	929	690	446	34
Netherlands	880	987	1,139	1,610	1,645	1,549
United Kingdom	2,144	1,024	1,590	1,298	1,290	718
Total	16,283	12,608	14,207	15,795	19,531	12,075
Other Europe						
Austria	190	266	76	86	218	30
Czechoslovakia	123	---	234	434	660	969
Finland	13	4	3	3	35	---
German Dem. Rep.	---	---	---	---	---	195
Greece	55	25	31	---	---	---
Hungary	---	---	---	---	---	293
Norway	741	548	326	536	681	218
Poland	49	---	---	---	641	535
Sweden	697	477	598	607	786	131
Switzerland	2,697	2,629	2,705	2,033	3,987	2,312
Other	47	20	2	28	66	6
Total	4,612	3,969	3,975	3,727	7,074	4,689
Total Europe	20,895	16,577	18,182	19,522	26,605	16,764
Latin America						
Argentina	14	---	---	---	114	12
Brazil	24	30	12	11	3	6
Colombia	9	11	5	14	5	1
Mexico	12	53	---	---	---	---
Venezuela	115	76	76	131	85	35
Other	2	---	---	1	1	1
Total	176	170	93	157	208	55
Other Countries						
Algeria	---	---	---	239	362	447
Australia	97	104	15	71	68	---
Canada	207	106	72	104	81	24
Cuba	63	74	68	95	---	---
Egypt	20	2	78	60	74	5
Jordan	16	3	44	145	142	75
Kenya	28	16	21	14	26	3
Kuwait	25	23	15	88	156	2
Lebanon	233	155	202	20	206	538
South Africa	100	122	89	42	55	20
Soviet Union	60	---	---	---	2,440	---
Syria	12	5	31	173	229	8
Other	125	127	119	196	161	1,981
Total	986	737	754	1,247	4,000	3,103
Grand Total	22,173	17,518	19,149	21,036	30,976	19,924

---Denotes not available, unknown, or not applicable.

Source: Official trade of Spain except 1977/78 partly estimated by U.S. Agricultural Attaché.

Table 7.—Almond exports from Spain, in shell: Av. 1970/71-1974/75, 1973/74-1977/78
(Metric tons)

Country of destination	Average 1970/71- 1974/75	Marketing year beginning October 1				
		1973/74	1974/75	1975/76	1976/77	1977/78
United States.	15	13	4	---	---	---
<u>Europe</u>						
<u>EC:</u>						
Belgium-Luxembourg	---	1	---	1	5	28
France.	414	211	190	486	779	170
Germany, West	57	18	81	80	105	40
Italy	212	363	219	380	337	291
Netherlands	---	3	---	---	1	11
United Kingdom.	258	65	156	341	239	245
Total	941	661	646	1,288	1,466	785
<u>Other Europe</u>						
Hungary	---	---	---	98	---	---
Switzerland	42	36	33	39	27	12
Other	---	---	1	2	2	---
Total	42	36	34	139	29	12
Total Europe	983	697	680	1,427	1,495	797
<u>Latin America</u>						
Argentina.	173	91	240	7	196	171
Brazil	460	531	399	348	264	149
Other	8	12	---	---	---	3
Total	641	634	639	355	460	323
<u>Other Countries</u>						
Australia	6	---	4	12	14	---
Canada	32	29	44	32	34	34
Dominican Republic	26	22	33	40	50	31
Egypt	---	---	---	60	141	107
Jordan.	1	---	1	28	75	82
Lebanon	6	3	10	1	1	1
South Africa	6	10	15	11	4	13
Other	12	15	15	31	17	35
Total	89	79	122	215	336	303
Grand total	1,728	1,423	1,445	1,997	2,291	1,423

-- Denotes not available, unknown, or not applicable.

Source: Official trade of Spain except 1977-78 partly estimated by Attaché.

Spain had its record export season in 1972/73 when it shipped 34,300 shelled tons of almonds and led the world in sales, because of a bumper domestic crop coupled with reduced supplies from California.

Almond shipments for the 1977/78 marketing season are estimated at 20,000 tons, shelled basis, 36 percent below the previous year's volume because of the March freeze that severely reduced Spain's almond output in 1977. Exports during the 1978/79 season are estimated at 28,000 tons, as new bearing trees and fair climatic conditions are expected to yield a 1978 crop of 60,000 tons.

In recent years about 98 percent of Spain's almond exports have been in the kernel form. In most seasons, about half of Spain's exports occur between September and January with heaviest shipments usually in October and November. Valencias are the most common variety exported, followed by Farmer Majorca and Langueta.

Europe. European countries have traditionally taken the bulk of Spain's almond shipments and have increased their share of the total over the years. Prior to World War II, 83 percent of Spanish almond exports went to Europe. This market share declined

slightly during the late 1950's to around 78 percent as shipments to Latin America expanded, then rebounded to around 85 percent in the 1960's as sales to Europe increased sharply. Despite stagnating exports during the first half of the 1970's, Europe's average share of the market rose to 93 percent, principally through declining sales to Latin America.

The European Community (EC) as a block now takes the lion's share of Spanish almond shipments. Kernel sales to the EC have averaged about 14,800 tons during the 5-year period 1973/74 through 1977/78. This represents about 68 percent of total Spanish shelled almond exports during the period and accounts for 76 percent of such sales to European countries. Within the EC, West Germany and France are the principal buyers, followed by the Netherlands and the United Kingdom. West Germany, Spain's primary market outlet, accounted for 38 percent of shipments to the EC during the 1970's and 27 percent of sales to all destinations.

Among other European countries, Switzerland is by far the largest taker of Spanish almonds, with 12 percent of the export volume. Secondary outlets include Sweden, Norway, and Czechoslovakia.

Latin America. Spain's almond sales to Latin American countries have varied widely over the years but have trended downward as most of these countries increased purchases of U.S. almonds. Latin America, which accounted for about 9 percent of Spanish almond shipments during the 1950's, currently comprises less than 1 percent of the market. Principal buyers include Venezuela and Argentina.

Other Countries. Since the mid-50's, all other countries (outside of Europe and Latin America) have accounted for around 8 to 9 percent of Spanish almond sales. The United States—the largest non-European market for Spanish almonds during the 1950's—has since cut its purchases sharply as its own production rose. U.S. imports of Spanish almonds averaged around 116 tons, shelled basis, during the first half of the 1970's compared with 1,100 tons in the late 1950's.

Canada was the primary non-European market in the 1960's, taking about 2 percent of deliveries. It has since fallen behind the Soviet Union, Algeria, and various Mideastern countries, which have increased their purchases as Canada has gotten more of its supplies from the United States.

GOVERNMENT POLICIES AND PROGRAMS

Spanish almond exporters have traditionally enjoyed some type of Government aid. However, in January 1975, the Ministry of Agriculture announced

a complete policy reversal in an order published in the Spanish State Gazette. The order states that the production of almonds shall, henceforth, be deprived of:

- The financial assistance granted to new groves under the Land Reform and Agricultural Development Act of 1973 (Part IV, Title V), namely loans for the purchase of land, repayable in 20 years and various forms of assistance in order to carry out specific improvement projects;
- The financial assistance granted under the Rural Planning Act of 1968, i.e. deferred payment (10 to 20 years) on plots allocated under the Act; loans and subsidization of up to 20 percent of the cost of permanent improvements in land and of facilities; and
- The benefits outlined in the Order of November 9, 1973, relative to assistance for procurement of production inputs as well as for improvement and/or introduction of new production techniques applied to tree nuts.

As justification for the sudden change in the almond production policy, the preamble of the order points to the disproportionate expansion of almond groves during the early 1970's that led to a saturated market in 1975 when a normal stock level of 5,000 shelled tons ballooned to 21,500 tons.

The surplus situation continued into 1976, a year after the policy change, when an abnormally high carryin coupled with a bumper harvest resulted in record supplies. The growers petitioned the Government for some sort of assistance to ease the downward price pressure caused by the excessive stock levels.

In late November 1976, the Spanish Farm Commodity and Price Stabilization Agency (FORPPA) agreed to grant a premium of 2.50 pesetas (US\$.04) per kilogram almond exports. The premium did not become effective until almond exports reached 20,000 shelled tons during the 1976/77 season. An estimated 100 million pesetas (\$1.47 million) was earmarked for this purpose. Spanish almond exporters, however, felt the export premium was not large enough and, therefore, did not consider it an incentive to export. Despite this reaction, Spain's almond industry achieved its second highest export season in history during 1976/77. Subsequently, during the 1977/78 season, the program was suspended.

Table 8.—Spain: Average price received for almonds by local producers, annual 1972-78

Year	U.S. cents per kilogram	Pesetas per kilogram ¹
	----- inshell basis -----	
1972	49.0	31.48
1973	69.8	40.67
1974	77.9	45.19
1975	60.1	34.54
1976	47.1	31.47
1977	67.7	51.48
1978 ²	83.5	60.00

¹ Exchange rates; Peseta equivalents of US\$1.00 in 1972-78 as follows: 1972, 64.25 pesetas; 1973, 58.25 pesetas; 1974, 58.00 pesetas; 1975, 57.50 pesetas; 1976, 66.75 pesetas; 1977, 76.00 pesetas; and 1978, 71.90 pesetas. ² U.S. Agricultural Attaché estimate.

Source: Spanish Ministry of Agriculture.

Table 9.—Monthly average prices for almonds, shelled, marketing seasons 1972/73-1977/78
(In U.S. dollars per metric ton)

Item and year	August	September	October	November	December	January	February	March	April	May	June	July	Average
1972/73													
United States ¹	1,673	1,664	1,761	1,797	1,828	1,841	1,949	2,092	1,936	2,258	2,152	2,235	1,932
Spanish Valencias ²	2,394	2,339	2,394	2,399	2,452	2,509	2,416	2,520	2,987	3,530	3,772	3,790	2,792
Italian Bari ³	2,372	2,330	2,262	2,242	2,251	2,295	2,330	2,608	3,139	3,688	3,825	3,880	2,769
1973/74													
United States ¹	2,130	3,137	3,082	3,047	3,166	2,992	3,278	3,190	3,514	3,338	3,375	2,738	3,082
Spanish Valencias ²	3,840	3,759	3,838	3,772	3,717	3,713	3,869	3,909	3,754	3,512	3,120	3,148	3,663
Italian Bari ³	3,902	3,997	3,889	3,750	3,812	3,735	3,657	3,677	3,463	3,441	3,144	3,075	3,629
1974/75													
United States ¹	2,952	2,599	2,491	2,273	1,971	2,249	2,158	2,024	2,200	2,266	2,293	1,951	2,286
Spanish Valencias ²	3,060	2,690	2,573	2,564	2,507	2,551	2,597	2,544	2,449	2,410	2,385	2,306	2,553
Italian Bari ³	3,053	2,994	2,855	2,784	2,635	2,692	2,646	2,588	2,489	2,476	2,432	2,385	2,669
1975/76													
United States ¹	2,187	2,134	2,026	2,023	2,041	1,999	2,022	2,055	2,090	2,037	2,105	2,045	2,064
Spanish Valencias ²	2,251	2,156	2,125	2,119	2,247	2,335	2,335	2,255	2,163	1,944	1,938	1,949	2,151
Italian Bari ³	2,284	2,227	2,075	2,037	2,081	2,030	2,130	2,006	1,863	1,953	1,918	1,916	2,043
1976/77													
United States ¹	1,998	1,953	1,944	1,898	1,801	1,980	2,019	2,041	2,082	2,234	2,159	2,016	2,010
Spanish Valencias ²	1,947	1,903	1,797	1,819	1,920	1,958	2,037	2,355	2,621	2,612	2,743	2,824	2,211
Italian Bari ³	1,944	2,070	2,172	2,068	2,046	2,094	2,145	2,341	2,235	2,266	2,332	2,577	2,191
1977/78													
United States ¹	2,173	2,281	2,339	2,371	2,408	2,503	2,502	2,664	2,684	2,557	2,537	2,682	2,475
Spanish Valencias ²	2,868	---	---	2,974	3,016	3,159	3,267	3,294	3,217	3,170	3,241	3,382	3,159
Italian Bari ³	2,440	2,498	2,557	2,720	2,747	2,983	3,139	3,060	3,036	2,892	2,989	3,080	2,845

--- Denotes not available, unknown, or not applicable.

¹ Prices are f.a.s., U.S. ports. ² Prices from August 1972 through November 1975 are on a c&f basis, U.K. ports; beginning December 1975, prices are on a c.i.f. basis, U.K. ports. ³ F.o.b. Bari, Italy.

Source: U.S., U.S. Bureau of Census; Spain, The Public Ledger, U.K. Publications, Ltd., London; and Italy, Reuters Fruit Report.

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